Solutions

Each answer shows the steps, then the **result**.

2.1

- auxin

2.2

- amylase

2.3

- touch: an insect bending the sensory hairs (twice within a short time)

2.4

- cell **expansion** (elongation), not division

3.1 A

- Auxin pumps H^+ into the wall, acidifying and loosening it

3.2 A

- Gibberellin switches on the amylase gene

3.3

- auxin makes the cell pump protons (H^+) into the cell wall; the acidified wall is loosened; so the cell stretches/elongates as water enters by osmosis

3.4

(a)

- the untreated seedling may make less gibberellin itself, so less starch is broken down / less elongation occurs

(b)

- e.g. treat with water only / same conditions otherwise

3.5

- bending a sensory hair opens calcium ion channels, and the influx of Ca^{2+} depolarises the cell, giving a receptor potential
- if two hairs are stimulated (or one hair twice) within about 20 seconds, an action potential is produced
- the action potential spreads across the lobes of the leaf
- cells change shape rapidly (by a fast movement of water / loss of turgor), so the lobes flip from convex to concave and the trap closes

3.6

- the seed absorbs water and the embryo releases gibberellin
- gibberellin causes the breakdown of DELLA proteins, so transcription of the gene for amylase can occur in the aleurone layer
- amylase hydrolyses starch in the endosperm to maltose, providing sugars for the growing embryo